

NAME: _____

Math 181, Calculus II

Hour Exam Two

9:00 am

April 11, 1997

1. The number of bird nests in a coastal wetland is approximately $f(x) = x(6 - x)$ nests per square mile for $0 \leq x \leq 6$ where x is the distance in miles from the coast.
 - a. Set up an integral that represents the total number of nests in a rectangular area 20 miles along the coast and 6 miles inland from the coast to dryer ground.
 - b. Evaluate this integral.
2. Find the volume of the solid obtained by rotating the region bounded by the lines

$$y = 3 - x, \quad y = 1, \quad x = 0, \quad \text{and} \quad x = 1$$

about the x -axis.

3. Some gasoline is stored in a cylindrical container 1.5 feet high and 3 feet in circumference. Recall that the pressure of the gasoline at a depth of y feet from the top of the container is $42y$ lb/ft². Find the total force on the side on the container.
4. The probability distribution $p(x)$ is given by

$$p(x) = \frac{2}{9}x \quad \text{for} \quad 0 \leq x \leq 3.$$

- a. What is the probability that x lies between 1 and 2?
 - b. What is the median value of x ?
 - c. What is the mean value of x ?
5. Find the Taylor polynomial of degree 4 approximating

$$f(x) = x - \ln(1 + x) \quad \text{for } x \text{ near } 0.$$

Use your answer to find

$$\lim_{x \rightarrow 0} \frac{x - \ln(1 + x)}{x^2}.$$